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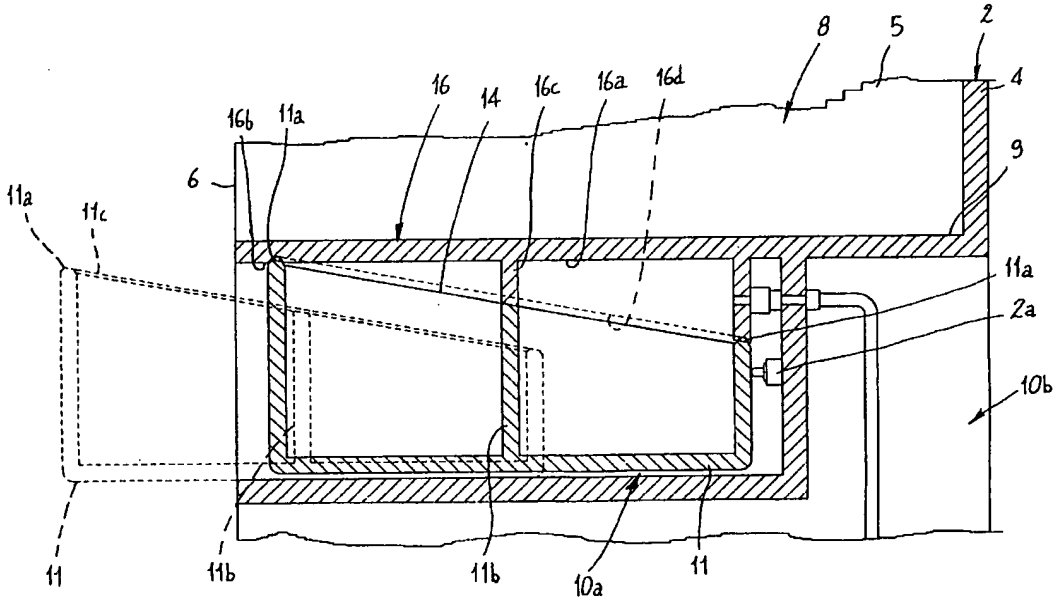

(57) Abstract: A device for the preservation of foods (1) comprises a containment body (2) inside which an extractable container (11) is situated. Devices (12) for producing a vacuum are associated to the containment body (2) for aspirating the air enclosed in the extractable container (11). A closure element (16) borne by a shelf (9) of the containment body (2) determines, by effect of the aspiration produced by the devices (12) for producing a vacuum, possibly through one or more fluid-dynamic actuators (19, 42), the hermetic closure of the extractable container (11) simultaneously with its acuation from an extracted position to an inserted position in the containment body (2).

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DEVICE AND METHOD FOR THE PRESERVATION OF FOODS UNDER VACUUM

Description

The present invention relates to a device for the preservation of foods comprising the characteristics expressed in the preamble to Claim 1.

The present invention further relates to a method for closing an extractable container engaged in a body for containing a device for the preservation of foods comprising the characteristics expressed in the preamble to Claim 26.

As is well known, in order to contrast the alteration of foods of animal and vegetable origin, be they fresh, cooked or dried, in addition to the preservation technique at low temperatures by refrigeration (around 0°C) or freezing (lower than -12°C), the vacuum packaging technique has been developed, particularly for fresh foods.

By this technique, foods are removed from contact with air and hence with oxygen, essential element for the life of many micro-organisms such as moulds and bacteria, and main cause of multiple alterations that lead to the non-edibility of a product.

The vacuum packaging technique also improves the preservation of the natural organoleptic characteristics of fresh and cooked food products preventing, for instance in foods containing fats, the phenomenon of rancidity and preventing water loss by evaporation, which would cause their drying.

The combination of low temperature preservation and the vacuum packaging technique allows considerably to prolong the preservation times of all foods and in particular it prevents the formation thereon of ice crystals which, by increasing their volume relative to water, would deform their superficial cells, compromising their physical integrity.

The prior art for placing foods under vacuum exposing them to low temperature provides for known refrigeration devices, such as ordinary refrigerators, to be provided with at least an extractable container which is subjected to the action

of appropriate apparatuses for aspirating air. More specifically, such apparatuses are able to aspirate the air present inside the extractable container when the latter is inserted into the refrigerator. In this situation, the pressure differential that is generated between the interior of the extractable container and the interior of the refrigerator causes a door for closing the extractable container to be locked in the closed position, thereby isolating the foods contained therein from the surrounding environment and from air.

Examples of product preservation devices similar to those mentioned above are described in the known documents EP 0440296, FR 1377844 and US 2894845.

All this stated, the Applicant has noted that known refrigeration devices can be improved above all in relation to the system for closing the extractable container, as well as its practicality of use.

The aim of the present invention is to propose a device for the preservation of foods which has a simplified structure and is practical to use.

This aim and others besides, which shall become more readily apparent in the course of the description that follows, are substantially reached by a device for the preservation of foods, comprising the characteristics expressed in the characterising part of Claim 1 and by a method for closing an extractable container engaged in a body for containing a device for the preservation of foods, comprising the characteristics expressed in the characterising part of Claim 26.

Further features and advantages shall become more readily apparent from the detailed description of a preferred, but not exclusive, embodiment of a device for the preservation of foods and of a method for closing an extractable container engaged in a body for containing a device for the preservation of foods, in accordance with the present invention. The description shall be made below with reference to the accompanying drawings, which provided purely by way of non limiting example, in which:

- Figure 1 is a section view of a device for the preservation of foods in accordance with the present invention;

- Figure 2 shows a longitudinal section of an extractable container of the subject device in the extracted and in the open position;
- Figure 3 shows a longitudinal section of the extractable container of Figure 2 in the inserted and in the closed condition;
- Figure 4 is a cross section representation of an actuator of the device of the invention;
- Figure 5 is a cross section of the extractable container in the closed condition;
- Figure 6 is a schematic top view of an element for closing the device of the invention;
- Figure 7 schematically shows a partial section view of an embodiment variation of the system for actuating the device;
- Figure 8 schematically shows a partial section view of another embodiment variation of the system for actuating the device;
- Figure 9 schematically shows a partial section view of a further embodiment variation of the system for actuating the subject device;
- Figure 10 shows, in longitudinal section, the extractable container according to a preferential embodiment;
- Figure 11 is an enlargement of a detail of Figure 10.

Referring to the cited figures, a device for the preservation of foods in accordance to the present invention has been generally identified by reference numeral 1.

As Figure 1 shows, the device for the preservation of foods 1 comprises at least a containment body 2 with substantially box-like shape having a bottom 3 wherefrom extend lateral walls 4 and a rear wall 5 integral with the lateral walls 4. In correspondence with the summit of the lateral walls 4 and of the rear wall 5 is engaged a substantially horizontal upper wall 5a. The access opening 6 can be opened and/or closed from an access door 7 hinged in one of the lateral walls 4. When the access door 7 closes the access opening 6, it defines together with the bottom 3, with the lateral walls 4 and with the upper wall 5 a containment volume 8.

As Figure 1 shows, the containment volume 8 provides for the presence of a series of shelves 9 whereon the products to be preserved can be placed. Moreover, a first area 10a of the containment volume 8 is destined to house at least an extractable container 11 inside which the products are advantageously preserved in a vacuum. A second area 10b of the containment volume 8, located in proximity to the bottom 3 and to the rear wall 5 of the containment body 2, is able to contain vacuum-producing means 12 operatively associated to the extractable container 11 and possible refrigeration means 13 active on the entire containment volume 8.

The extractable container 11 is substantially shaped as a box and has an upper opening 14 through which it is possible to insert and extract the various products to be preserved. Moreover, the extractable container 11 is free to slide horizontally, by means of appropriate sliding guides 15 interposed between the extractable container itself and the containment body 2, between an inserted position (Figures 1, 3 and 6 - 10) wherein the extractable container 11 is situated completely within the containment body 2 and an extracted position (Figure 2) wherein the extractable container 11 projects in overhang from the first area 10a and more specifically through the access opening 6. Obviously, when the extractable container 11 is in the extracted position, the access door 7 of the containment body 2 must be open.

When the extractable container 11 is in the inserted position, it acts directly on an activation element 2a which can be constituted, for instance, by an electrical switch or similar electrical control device which activates the vacuum-producing means 12 to aspirate the air present inside the extractable container 11.

The device 1 further comprises a closure element 16 operatively engageable to the extractable container 11 to close the latter hermetically by means of at least a closure surface 16a facing the extractable container 11.

As the accompanying figures show, the closure element 16 is borne by the shelf 9 of the containment body 2. More specifically, the closure element 16 is obtained from a single piece with the shelf 9 constituting a part thereof. Consequently, the closure surface 16a is constituted by the lower surface of the shelf 9 bearing the

closure element 16.

The closure element 16 may project inferiorly from the shelf 9 and be shaped as a dome so that the closure surface 16a is substantially concave and terminates with at least a peripheral edge 16b counter-shaped relative to a sealing edge 11a of the extractable container 11 (Figure 10). In this condition, the closure surface 16a of the closure element 16 defines a housing space.

Actuating means 17 can also be provided, able to intervene when the extractable container 11 is taken to the inserted position, mutually to approach the extractable container 11 and the closure element 16 between an opened condition (Figures 2 and 4) wherein the extractable container 11 is substantially distanced from the closure element 16 and a closed condition (Figures 1, 3 and 5 - 10) wherein the closure element 16 is pressed against the extractable container 11 closing its upper opening 14 with its own closure surface 16a. When the extractable container 11 is in a closed condition, an appropriate gasket 18, interposed between the extractable container 11 and the closure element 20, is pressed between the sealing edge 11a and the peripheral edge 16a. In this situation, the gasket 18 renders the closure of the extractable container 11 more hermetic.

In the embodiment shown in Figures 1 through 6, the actuating means 17 comprise at least a fluid-dynamic actuator 19, preferably pneumatic, active on the extractable container 11 and able to be activated by the vacuum-producing means 12.

More in detail, the actuating means 17 comprise two actuators 19 operating on the peripheral edge 16b of the closure element 16, in correspondence with opposite longitudinal segments 16d thereof, extending parallel to the direction of sliding of the extractable container 11 between the inserted position and the extracted position. The actuators 19 are operatively interposed between the closure element 16 and the extractable container 11 and each comprises a fixed structure 20 and a movable structure 21.

The fixed structure 20 presents at least a base wall 20a wherefrom extends at least a peripheral projection 20b. The movable structure 21 in turn comprises a

deformable membrane 22 hermetically engaged on the peripheral projection 20b of the fixed structure 16 to delimit a compartment 23 therein. The movable structure further presents at least a hitching element 24 rigidly engaged with a first extremity 24a, to the deformable membrane 22 and operatively engageable, with a second extremity 24b, in at least a respective hitching seat 25 borne by the sealing edge 11 of the extractable container 11. In detail, to each deformable membrane 23 are rigidly engaged three mutually distanced hitching elements 24. On the opposite side relative to the deformable membrane 23 at least a plate-shaped element 26 is fastened to the second extremity 24b of each hitching element 24.

The plate-shaped element 26 interacts with the respective hitching seat 25 obtained in the extractable container 11 to connect the latter mechanically with the deformable membrane 22 of the respective actuator 19.

Advantageously, both the base wall 20a and the peripheral projection 20b of the fixed structure 20 of each actuator 19 have a preferential dimension equal to the length of the longitudinal segment 16d of the peripheral edge 16b of the closure element 16 whereon they are fastened.

As shown schematically in Figures 1 through 6, the container 23 of each actuator 19 is in fluid communication with the vacuum-producing means 12 by means of at least an aspiration conduit 27 which is connected to a first port 28 obtained through the fixed structure 20. Moreover, each compartment 23 presents a second port 29 (Figure 4) wherefrom extends a connecting conduits 30 engaging the closure element 16 in such a way that when the extractable container 11 is in closed condition it is possible to determine, through the connection conduit itself, the compartment 23 and the aspiration conduit 27, a vacuum inside the extractable container 11.

To each connecting conduit 30 is also operatively associated an on-off valve 31 able to be switched in opening and/or closure to place in fluid communication the connecting conduit itself, and hence the extractable container 11, with the vacuum-producing vacuum 12. This on-off vacuum 31 can be activated, for instance

mechanically, by the actuators 19. In the embodiment shown in Figures 4 and 5, the activation of the on-off valve 31 is effected by the raising of the deformable membranes 22 and by the latching elements 24, whereof one interacts therewith by means of its own extremity 24a.

The device 1 further comprises, for each actuator 19, at least a capillary connection conduit 32 presenting at least a segment having considerably lesser diametrical dimensions than the diameter of the connecting conduit 30 and extending from the actuator 19 to an auxiliary aspiration opening 33 joined to the extractable container 11 through the closure element 16. When the on-off valve 31 of the connecting conduit 30 is in the closed condition, the passage of air between the extractable container 11 and the compartment 23 is regulated and controlled by the capillary connection conduit 32.

It should however be noted that for the purposes of the invention the capillary connection conduit 32 can be replaced with a flow rate regulating valve operatively engaged to the respective connection conduit 30. The flow rate regulating valve, which can be integrated in the on-off valve 31, serves the same functions as the capillary connection conduit 32 allowing a controlled passage of air between the extractable 11 and the compartment 23 of each actuator 19.

Naturally, this flow rate regulating valve can be developed according to any configuration whatsoever, but it is preferable for it to be defined by at least a segment with reduced section of the capillary connection conduit 32.

Alternatively, the on-off valve 31 may advantageously constructed in such a way as to allow, in the closed condition, a controlled passage of air. This solution can be used instead of the capillary connection conduit 32 or of the flow rate regulating valve in order further to simplify the structure of the device 1.

To cause the opening and consequently the extraction of the extractable container 11, the latter is fitted with a grip handle 34 which is operatively connected to a sealing valve 35 active on an air inlet opening 36 obtained through the extractable container itself. More in detail, the grip handle 34 presents a movable

portion 34a hinged, with one extremity, to the grip handle itself and bearing, with the other extremity, a plug 35a of the sealing valve 35. An elastic return element 37 is operatively interposed between the grip handle 34 and the movable portion 34a to hold the plug 35a constantly pressed against the air inlet opening 36 thereby determining its occlusion. When a user grabs the grip handle 34 to extract the extractable container 11 from the containment body 2, he/she presses the movable portion 34a against the grip handle 12 compressing the elastic return element 37. This causes the plug 35a to be moved away from the air inlet opening 36, i.e. the sealing valve 35 to be opening, which places in fluid communication the extractable container 11 with the surrounding environment.

The operation of the device for the preservation of foods, heretofore described mainly in the structural sense, is as follows.

When the extractable container 11 is moved from the extracted position to the inserted position, it acts directly on the activating element 2a which activates the vacuum-producing means 12. The vacuum-producing means 12 aspirate the air present inside the compartment 23 of each actuator 19 through the respective aspiration conduits 27. During the aspiration of the air present inside each compartment 23, the on-off valve 31 occludes the connecting conduit 30 preventing the direct aspiration of the air present in the containment body 2. Thereupon, between the compartment 23 of each actuator 19 and the containment body 2 a pressure differential is created, causing the displacement of each deformable membrane 22 towards the respective compartment 23. Consequently, the latching elements 24 are lifted by pulling upwards, through the respective plate-shaped elements 26, the extractable container 11. In this situation, the extractable container 11 is moved from the opened condition to the closed condition.

After the closure of the extractable container 11 the on-off valve 31 is switched to the open condition, placing each compartment 23 in fluid communication with the extractable container 11.

The air present inside the extractable container 11 is aspirated thereby through

the connecting conduits 30, the compartments 23, the aspiration conduits 27 and the capillary connection conduits 32, generating a vacuum.

To empty the extractable container 11, it is necessary to act on the sealing valve 35. In detail, by activating this valve a passage of air is caused from the containment body 2 to the extractable container 11 which, once the equilibrium between pressures is re-established, is no longer pressed against the closure element 16. In this situation, by the action of gravity, the extractable container 11 tends immediately to move away from the closure element 16 passing from the closed condition to the open condition. In the first part of the stroke, the descent of the latching element 24 causes the on-off valve 31 to close. However, the immediate detachment of the extractable container 11 from the closed element 16 does not occur, since each compartment 23 still remains under vacuum. Equilibrium between the internal pressure of each compartment 23 and the pressure of the surrounding environment is reached gradually by means of the capillary connection conduit 32 or through the flow rate regulating valve - if one is present - of the connecting conduit 30. In this way, each actuator 19 cushions the lowering of the extractable container 11 which, advantageously, translates slowly from the closed condition to the open condition without being subjected to sudden drops which could damage the components.

In the embodiment variation of Figure 7, the actuating means 17 comprise guide elements 38 respectively borne by the extractable container 11 and by the containment body 2. In particular, the guide elements 38 comprise at least a fixed guide element 39 defined by a supporting divider 40 rigidly engaged internally to the containment body 2 and at least a movable guide element 41 defined by the lower surface of the extractable container 11. Both the fixed guide element 39 and the movable guide element 41 comprise first substantially rectilinear sliding segments 39a, 41a interacting with each other to guide the actuation of the extractable container 11 between the extracted position and the inserted position, as well as second guide segments 39b, 41b oriented obliquely relative to the first segments 39a,

41a and mutually interacting to determine the passage between the open condition and the closed condition of the extractable container 11.

More in detail, when the extractable container 11 is inserted into the containment body 2, the first segments 41a of the movable guide element 41 slide on the first segments 39a of the fixed guide element 39. This horizontal advance is maintained substantially unaltered until the extractable container 11 arrives in proximity to the inserted position.

Upon the further advance of the extractable container 11, the second segments 39b, 41b cause the raising of the extractable container 11 until its closure. Moreover, to aid the insertion of the extractable container 11 into the containment body 2, the presence of an auxiliary actuator 42 is advantageously provided for, such auxiliary actuator 42 being constituted for instance by a bellows element having an extremity 42a substantially shaped as a suction cup whereon the extractable container 11, as the inserted position is approached, bears. When the extractable container 11 acts on the activation element 2a the vacuum-producing means 12 aspirated, through an appropriate connection conduit 42b, the air present inside the auxiliary actuator 42 which initially adheres with its own suction cup portion 42a onto the surface of the extractable container 12 and then contracts, by effect of the generated vacuum, pulling the extractable container 11 towards the inserted position.

Figure 8 schematically shows an additional embodiment of the system for actuating the extractable container 11. In this case, the actuating means 21 comprise a first and a second actuation organ 43, 44, operatively interposed between the extractable container 11 and the containment body 2.

The first actuation organ 43 is operatively engaged to the containment body 2 through a horizontal portion 43a and is operatively connected to an auxiliary actuator 42 through a vertical portion 43b which extends from an extremity of the portion 43a. The first actuation organ 43 further comprises wedge elements 43c rigidly engaged to the horizontal portion 43a each presenting at least an inclined surface 43d.

The first actuation organ 43 is movable according to a direction that is substantially parallel to the direction of actuation of the extractable container 11 between the extracted and the inserted position.

The second actuation organ 44 is operatively interposed between the first actuation organ 43 and the extractable container 11.

This second actuation organ 44 can, for instance, be constituted by trapezoidal elements 44a each presenting at least an inclined surface 44b. More specifically, the second actuation organ 44 is rigidly engaged to the sliding guides 15 which in turn are engaged in appropriate slots 15a obtained in the containment body 2 so that both the sliding guides 15 and the second actuation organ 44 are movable in a direction that is substantially perpendicular to the direction of actuation of the extractable container 11. When the extractable container 11 is moved between the extracted position and the inserted position, the inclined surfaces 43d, 44b of the first and of the second actuation organ 43, 44 interact with each other to cause the passage between the open condition and the closed condition of the extractable container itself.

Figure 9 shows a third embodiment of the system for actuating the extractable container 11 which provides for the use of at least a lifting organ 45 pivotingly engaged to the containment body 2 and active with its own lifting portion 45a inferiorly on the extractable container 11. In detail, the lifting body 45 is constituted by a plurality of bars 45b movable between a resting position, wherein they are substantially positioned horizontally with their lifting portion 45a inactive and an operative position, wherein the bars 45b of the lifting organ 45 are substantially erect with their lifting portion 45a engaged on the lower surface of the extractable container 11.

As Figure 9 shows, the bars 45 are mechanically connected to each other and to the auxiliary actuator 42 by means of a transmission organ 46. More specifically, the transmission organ 46 has an attachment surface 46a operatively engaged by the suction cup portion 42a of the auxiliary actuator 42 in such a way that when the

auxiliary actuator 42 is contracted the bars 45b are erect and consequently, the extractable container 11 is in the closed condition.

A further preferential embodiment of the invention is shown in Figures 10 and 11. In this embodiment, the extractable container 11 has sealing edges 11a having longitudinal segments 11c inclined relative to the direction of sliding of the extractable container itself and the closure element 16 presents a peripheral edge 16b having longitudinal segments 16d substantially parallel to the longitudinal segments 11c of the sealing edge 11a of the extractable container 11. By means of this configuration, the open condition and the closed condition of the extractable container 11 correspond to its extracted position and to its inserted position. In other words, when the extractable container 11 is in the extracted position it is simultaneously in opened conditions, whereas when the extractable container 11 is in the inserted position, the longitudinal segments 16d of the closure element 16 act in contrast relationship against the longitudinal segments 11c of the extractable container 11 determining its closed condition.

As Figure 11 shows, the sealing edge 11a of the extractable container 11 can present a substantially trapezoidal profile destined to match, in the closed condition, with a groove 11d with substantially trapezoidal profile, obtained in correspondence with the peripheral edge 16b. In correspondence with the groove 11d is engaged the gasket 18, destined to be pressed when the extractable container 11 is put in a vacuum. Alternatively, the gasket 18 can be operatively interposed between surfaces with planar or curved, rather than trapezoidal, profile.

In detail, when the extractable container 11 is pushed into the inserted position the sealing edge 11a lightly presses the gasket 18. At the same time, the activation element which has been activated by the extractable container 11 activates the vacuum producing means 12 which aspirate the air present inside the extractable container 11. As the pressure differential between the extractable container 11 and the surrounding environment increases, the extractable container itself tends to move slightly towards the closure element 16. In this situation, the extractable container

11 lifts up until it closes definitively.

As shown in Figure 10, one or more reinforcing elements 11b are positioned inside the space housing the extractable container 11 and project towards the closure element 16. These reinforcing elements 11b are able to act in contrast relationship against he closure element 16 when the extractable container 11 is in the closed condition.

In detail, it is preferable for the reinforcing elements 11b to be constituted by dividers that are integral with the structure of the extractable container 11. In this case, these dividers not only stiffen the structure of the extractable container 11, but also subdivided its inner space into different housing chambers. Also with reference to Figure 10, the closure element 16 presents respective contrast elements 16d projecting towards the extractable container 11 and each able to act in contrast relationship with the respective reinforcing element 11b. Like the reinforcing elements 11b, each contrast element 16d is integral with the closure element 16, strengthening and stiffening it.

When the extractable container 11 is in the closed condition, the terminal edges of the reinforcing elements 11b of the extractable container 11 are pressed against the terminal edges of the contrast elements 16d of the closure element 16. In this situation, the elements 11b, 16d constitute a single internal structure strengthening the extractable container 11 which provides it with a high resistance against the forces, determined by the pressure differential between the interior and the exterior of the extractable container 11, directed perpendicularly relative to its outer surfaces. This configuration advantageously allows to design and construct the extractable container 11 according to a thin and light structure.

It should also be noted that the reinforcing elements 11b and the contrast elements 16d, shown only in the embodiment of Figure 10 for the sake of descriptive simplicity, can be present in all embodiments that comprise an extractable container 11 and a substantially dome-shaped or lid-shaped closure element 16.

The present invention achieves the proposed aims and attains important

advantages.

First of all, the device for the preservation of foods according to the invention presents a considerably simplified structure relative to known devices. In particular, the system for actuating the extractable container 11 allows to eliminate the closure door associated thereto, replacing it with one of the shelves 10 of the device 1. The closure of said extractable container 11 is effected by bringing the latter against the respective shelf 10.

It should also be considered that the system for closing the extractable container is practical and easy to use since the user merely needs to arrange the products in the extractable container 11 and insert the latter into the containment body 2.

Claims

1. A device for the preservation of foods comprising:

- a containment body (2) presenting an access door (7) and at least an internal shelf (9);
- at least an extractable container (11), engaged in the containment body (2);
- at least a closure element (16) operatively engageable on a sealing edge (11a) presented by said extractable container (11) in order hermetically to close the latter;
- means (12) for producing a vacuum, operatively associated to said extractable container (11);

characterised in that said closure element (16) is borne by the shelf (9) of the containment body, said extractable container (11) being movable between an open condition, in which said sealing edge (11a) is removed from the closure element (16), and a closed condition in which said sealing edge (11a) is set in engagement relationship against the closure element itself.

2. A device as claimed in claim 1, wherein the sealing edge (11a) of the extractable container (11) presents longitudinal segments (11c) inclined relative to a direction of sliding of the extractable container itself between the open condition and the closed condition, the closure element (16) presenting a peripheral edge (16b) having longitudinal segments (16d) substantially parallel to the longitudinal segments (11c) of the sealing edge (11a) and acting in contrast relationship against it when the container (11) is thrust towards the closed condition.

3. A device as claimed in claim 1, further comprising actuating means (17) for determining a relative approach motion between the extractable container (11) and the closure element (16) from the open condition to the closed condition.

4. A device as claimed in claim 3, wherein said extractable container (11) is

movable between an inserted position and an extracted position from the containment body (2), according to a direction that is substantially transverse relative to a direction of actuation of the extractable container itself between the open condition and the closed condition, said actuating means (17) being able to be activated to determine the translation of the extractable container (11) from the open condition to the closed condition when the extractable container itself arrives in proximity to said inserted position.

5. A device as claimed in claim 3, wherein the closure element (16) is fixed relative to the containment body (2) and the actuating means (17) operate on the extractable container (11) to move it relative to the closure element itself.

6. A device as claimed in claim 3, wherein the actuating means (17) are operatively interposed between the extractable container (11) and the closure element (16).

7. A device as claimed in claim 3, wherein the actuating means (17a) comprise at least an actuator (19) active on the extractable container (11).

8. A device as claimed in claim 7, wherein the actuator (19) is a pneumatic actuator able to be activated by the means (12) for producing a vacuum.

9. A device as claimed in claim 8, comprising at least a connecting conduit (30) extending from the actuator (19) to a communication opening joined to the extractable container (11) through said closure element (16), to place in fluid communication the extractable container itself with the means (12) for producing a vacuum through said actuator (19).

10. A device as claimed in claim 9, further comprising an on-off valve (31)

operating on a connection conduit (30) to enable and disable selectively the fluid communication along the connection conduit itself when the extractable container (11) is respectively in the closed condition and in the open condition.

11. A device as claimed in claim 9, further comprising at least a flow rate regulating valve operatively associated to said connection conduit (30).

12. A device as claimed in claim 11, wherein said flow rate regulating valve is substantially defined by at least a segment with reduced section of the connection conduit (30).

13. A device as claimed in claim 10, further comprising at least a capillary connection conduit (32) presenting at least a segment with lesser diametrical dimensions than the diameter of the connection conduit (30) and extending from the actuator (19) to an auxiliary communication opening joined to the extractable container through said closure element (16).

14. A device as claimed in claim 8, wherein the actuator (19) comprises:

- a fixed structure (20) presenting at least a base wall (20a) wherefrom extends at least a peripheral projection (20b),
- a deformable membrane (22) engaged on the peripheral projection (20b) of the fixed structure (20) to delimit therein a compartment (23), the compartment (23) being in fluid communication with the means (12) for producing a vacuum through the aspiration conduit (27) which is connected to a first port (28) obtained through the fixed structure (20);
- at least a latching element (24) rigidly engaged with a first extremity (24a) to the deformable membrane (22) and operatively engageable with a second extremity (24b) in at least a latching seat (25) obtained in the extractable container (11).

15. A device as claimed in claim 14, wherein the fixed structure (20) of the actuator (19) is joined in a single piece with the closure element (16).

16. A device as claimed in claim 14, wherein said base wall (20a) presents a longitudinal development that is substantially equal to the length of a longitudinal segment (11b) of the extractable container (11).

17. A device as claimed in claim 1, wherein the closure element (16) is obtained in a single piece with the shelf (9) of the containment body (2).

18. A device as claimed in claim 1, wherein the closure element (16) is constituted by the shelf (9) of the containment body (2).

19. A device as claimed in claim 1, wherein the closure element (16) is shaped substantially as a dome and presents a substantially concave closure surface (16a) oriented towards the extractable container (11) terminating with at least a peripheral edge (16) counter-shaped relative to the sealing edge (11a) of the extractable container.

20. A device as claimed in claim 1, wherein the extractable container (11) internally presents at least a reinforcing element (11b) projecting towards the closure element (16) and able to act in contrast relationship against the closure element itself when the extractable container (11) is in the closed condition.

21. A device as claimed in claim 20, wherein the closure element (16) presents at least a contrast element (16d) projecting towards the extractable container (11) and able to act in contrast relationship against said reinforcing element (11b).

22. A device as claimed in claim 20, wherein said reinforcing element (11b) is

defined by at least a divider extending through the extractable container (11).

23. A device as claimed in claim 4, wherein the actuating means (17) comprise guide elements (38) respectively borne by the extractable container (11) and by the containment body (2), said guide elements (38) comprising first substantially rectilinear sliding segments (39a, 41a) interacting on the extractable container (11) to guide its actuation between the extracted position and the inserted position, as well as second sliding segments (39b, 41b) oriented obliquely relative to the rectilinear segments and interacting on the extractable container (11) to guide its actuation between the open condition and the closed condition.

24. A device as claimed in claim 4, wherein the actuating means (17) comprise:

- a first actuation organ (43) movable according to a direction that is substantially parallel to the direction of actuation of the extractable container (11) between the extracted position and the inserted position;
- a second actuation organ (44) interacting with said first actuation organ (43) in correspondence with at least an inclined contact surface (43d, 44b) and movable in a direction substantially perpendicular to the direction of actuation of the extractable container (11) between the extracted position and the inserted position, to bring the extractable container itself in the closed condition following a displacement imposed on the first actuation organ (43).

25. A device as claimed in claim 1, wherein the actuating means (17) comprise at least a lifting organ (45) pivotingly engaged to the containment body (2) and active with its own lifting portion (45a) on the extractable container (11), the lifting organ (45) being movable between a resting position in which the lifting portion (45a) is inactive and the extractable container (11) is in the open condition and an operative position in which the lifting portion (45a) is engaged against the extractable container (11) and the latter is in the closed condition.

26. A method for closing an extractable container engaged in a body for containing a preservation device for foods, comprising the following phases:

- hermetically closing the extractable container (11);
- moving said extractable container (11) between an inserted position in which the extractable container (11) is fully situated within the containment body (2) and an extracted position in which the extractable container (11) projects in overhang towards an access opening (6) of the containment body itself;
- extracting the air from the extractable container (11),

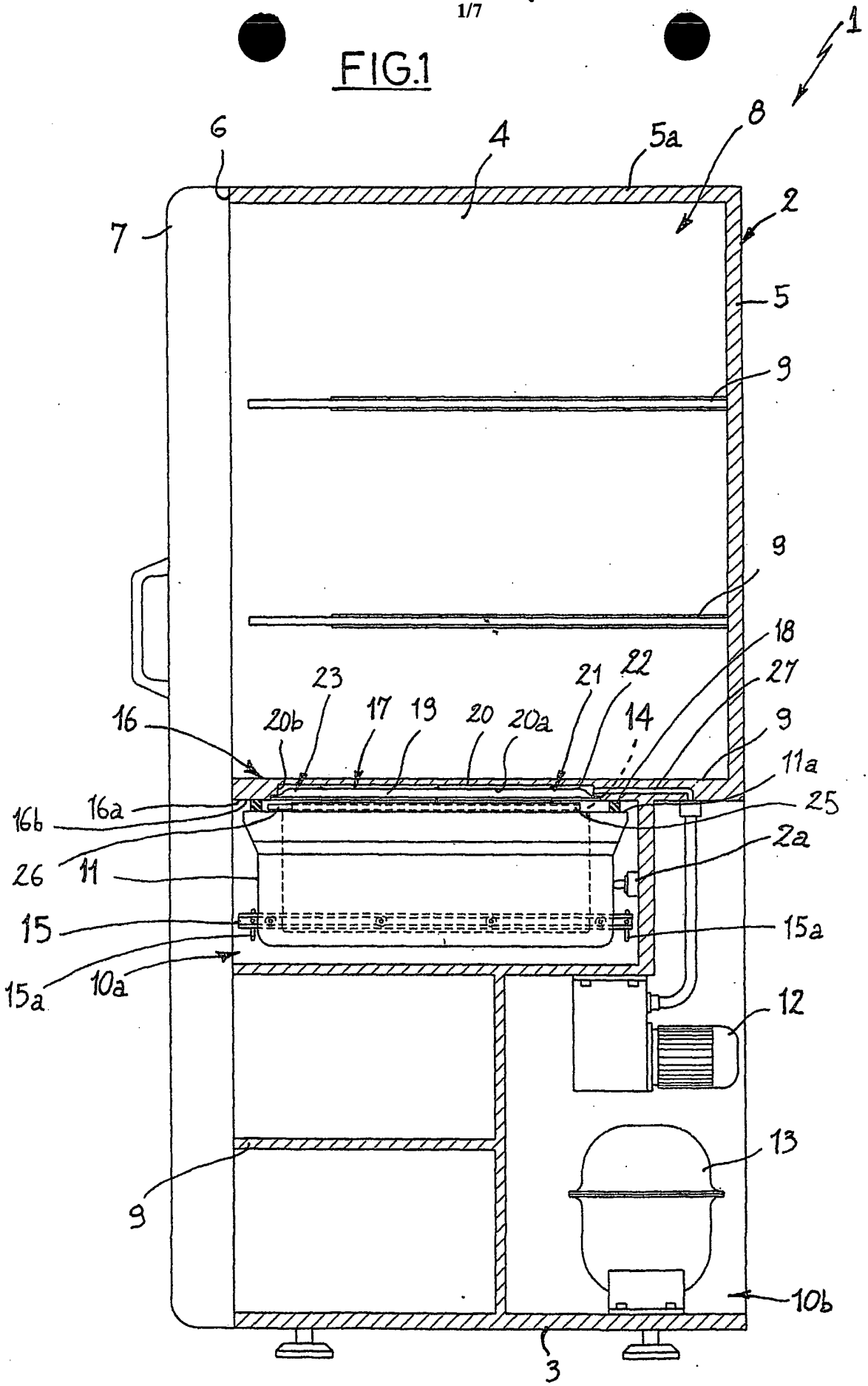
characterised in that the hermetic closure of the extractable container (11) is effected immediately after its actuation towards the inserted position, determining a relative motion between the extractable container (11) and a closure element (16) borne by a shelf (9) engaged in the containment body (2), between an open condition in which they are distanced and a closed condition in which the closure element (16) hermetically closes the extractable container (11).

27. A method as claimed in claim 23, wherein said actuation between the open condition and the closed condition is carried out maintaining the closure element (16) fixed and moving the extractable container (11).

28. A method as claimed in claim 23, wherein said actuation between the open condition and the closed condition is carried out by means of an aspiration effect produced for the purpose of extracting air from the extractable container (11).

29. A method as claimed in claim 25, wherein the actuation between the open condition and the closed condition is determined obtaining said aspiration effect through at least a fluid-dynamic actuator (19, 42) operating on said extractable container (11) and/or on said closure element (16).

FIG.1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10b
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FIG.2

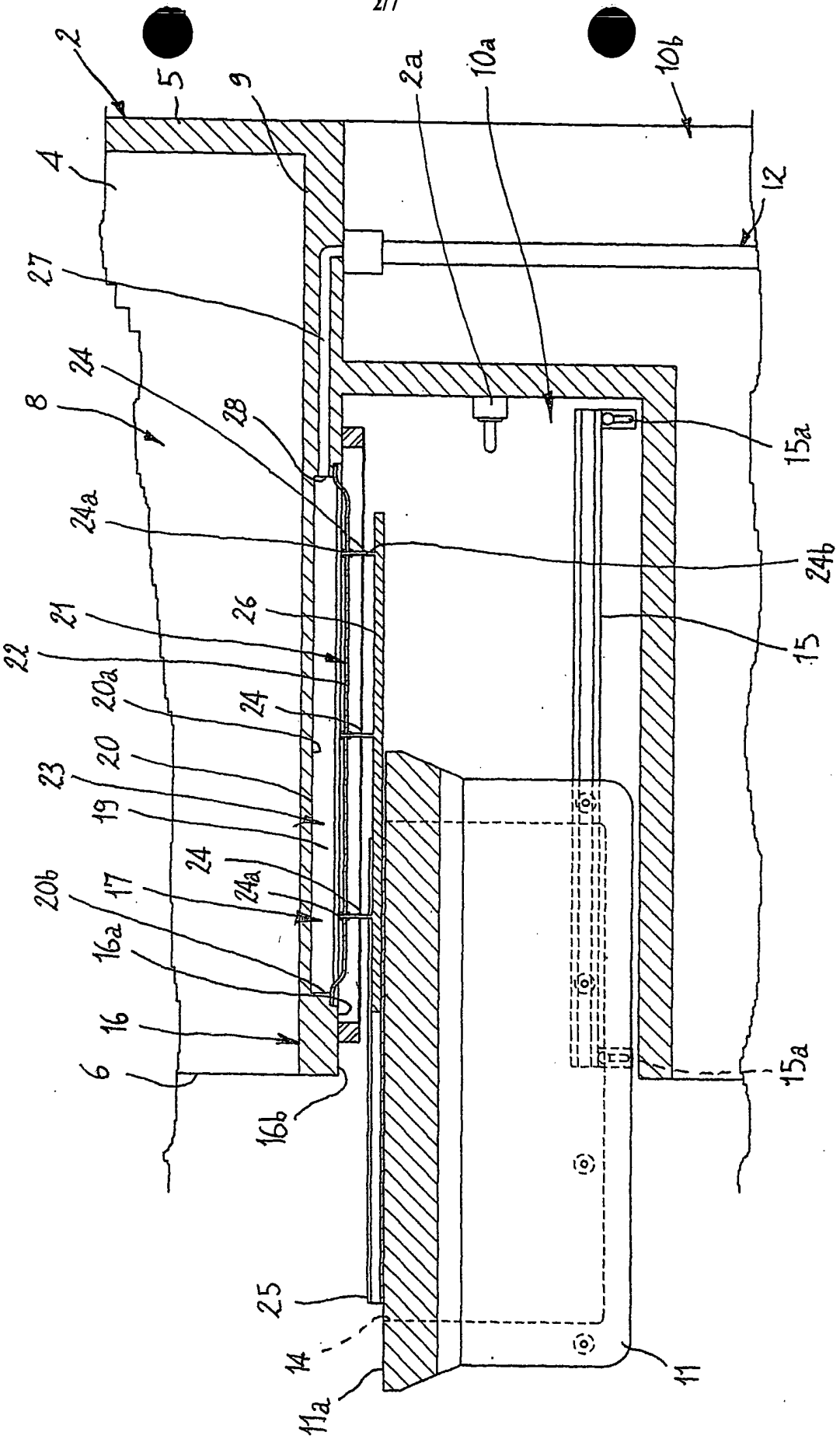
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FIG.3

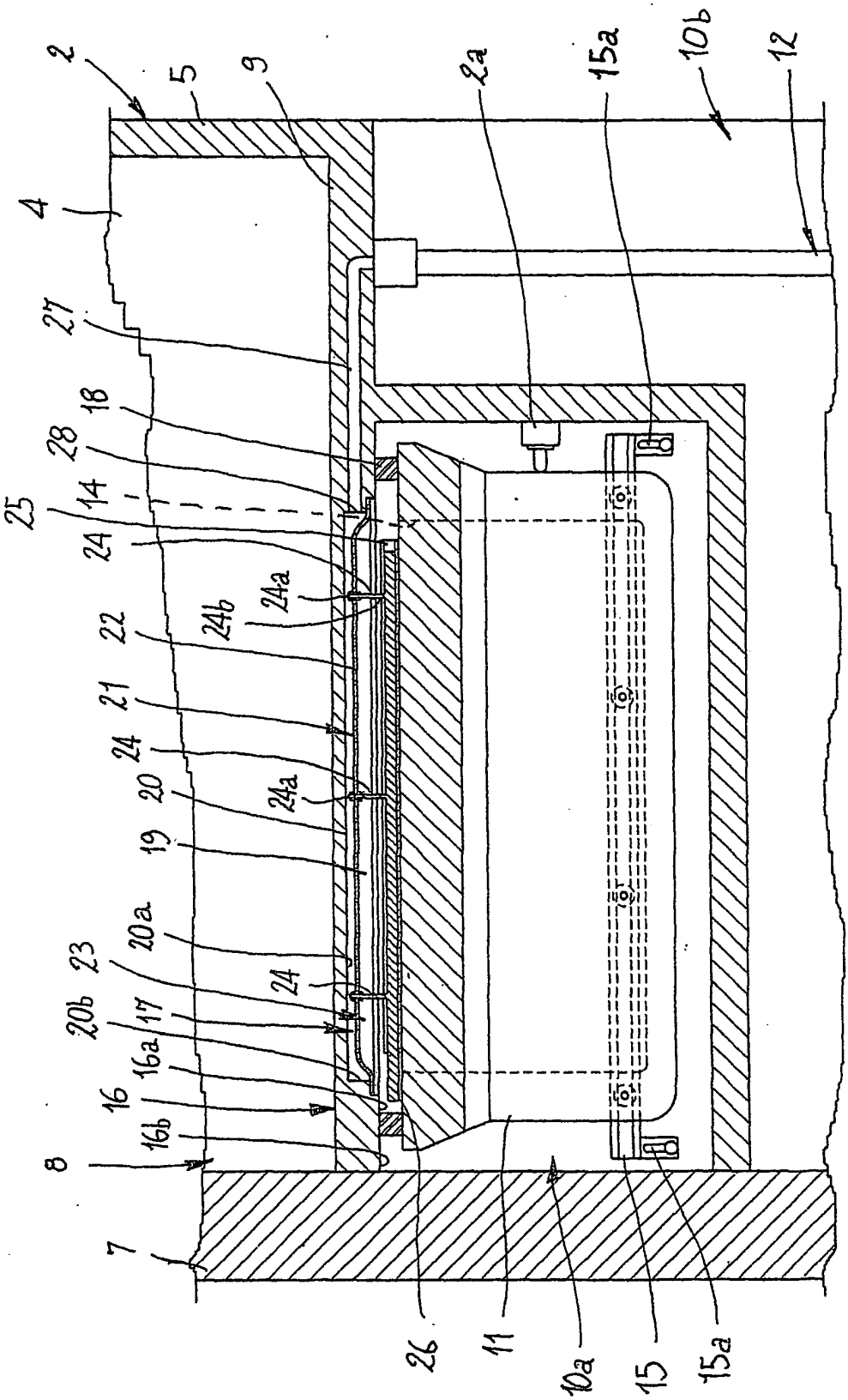
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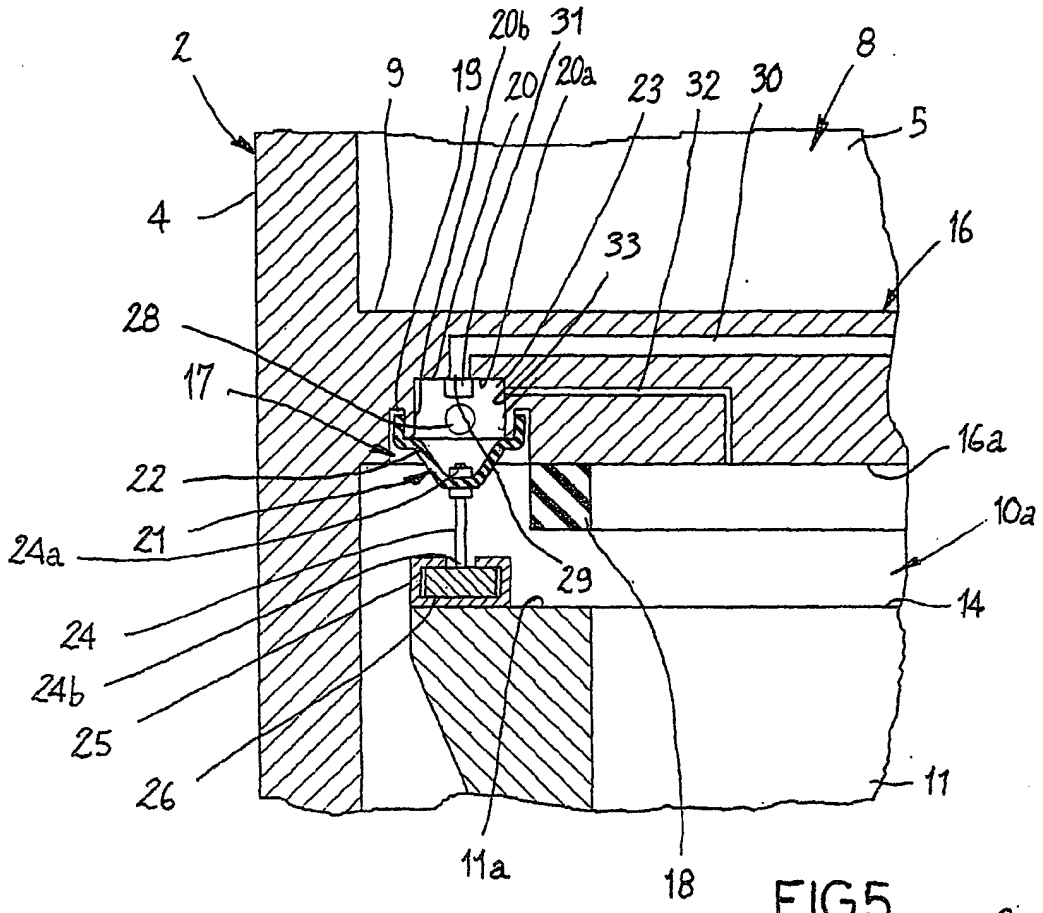
FIG.4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11a
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FIG.5

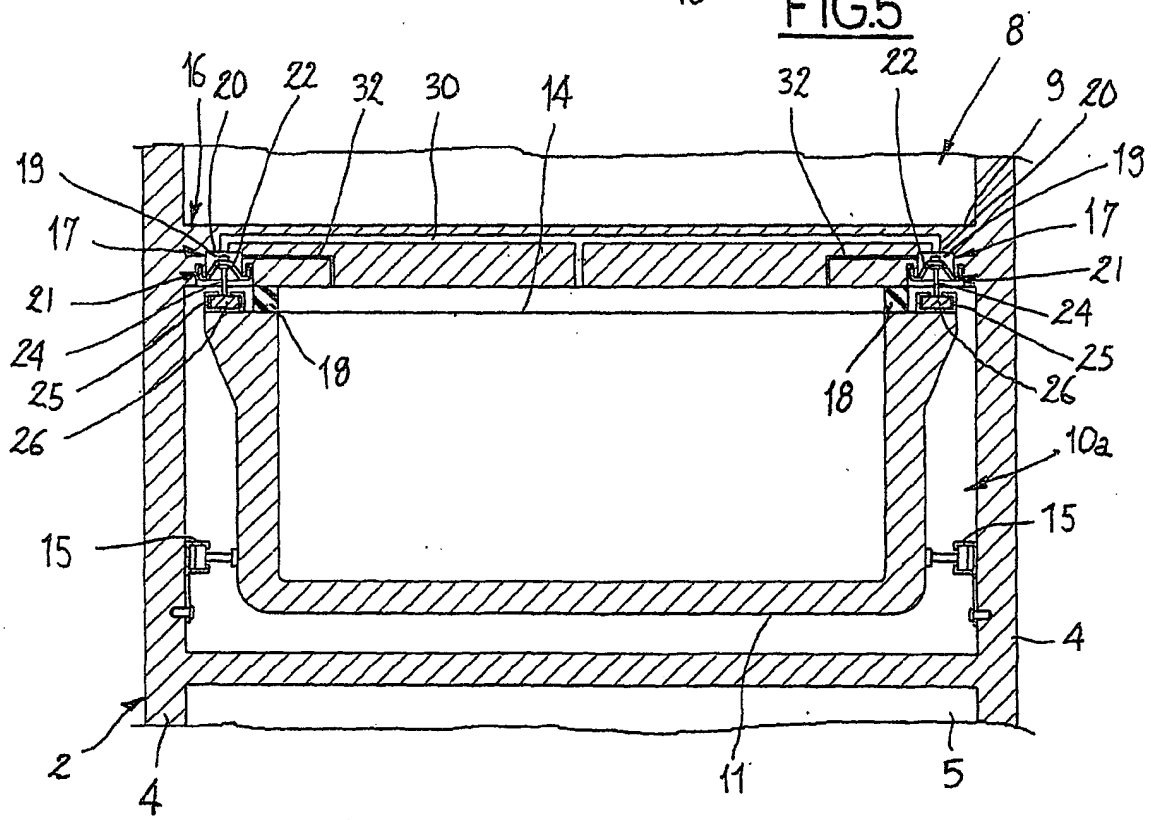
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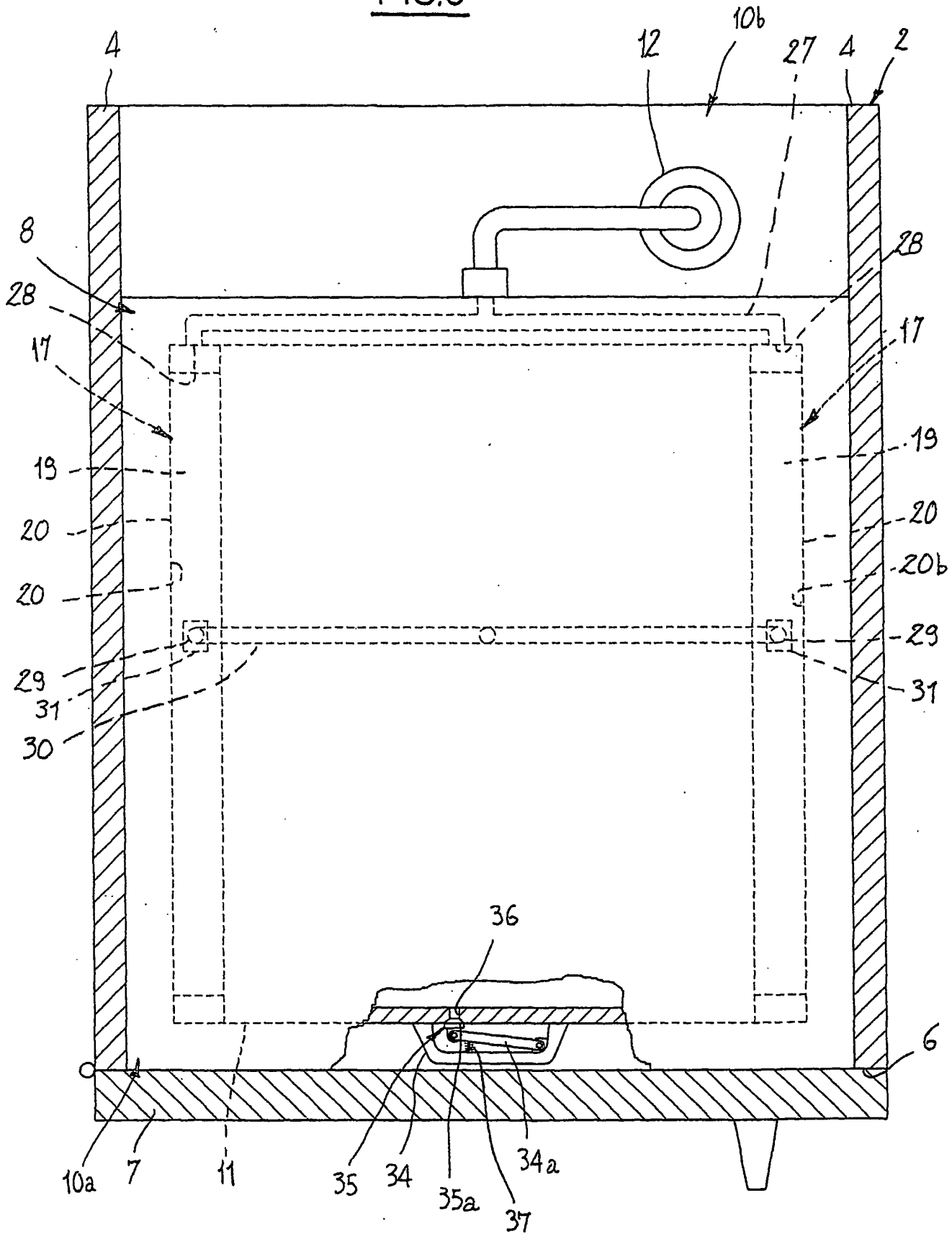
FIG.6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34a

FIG.7

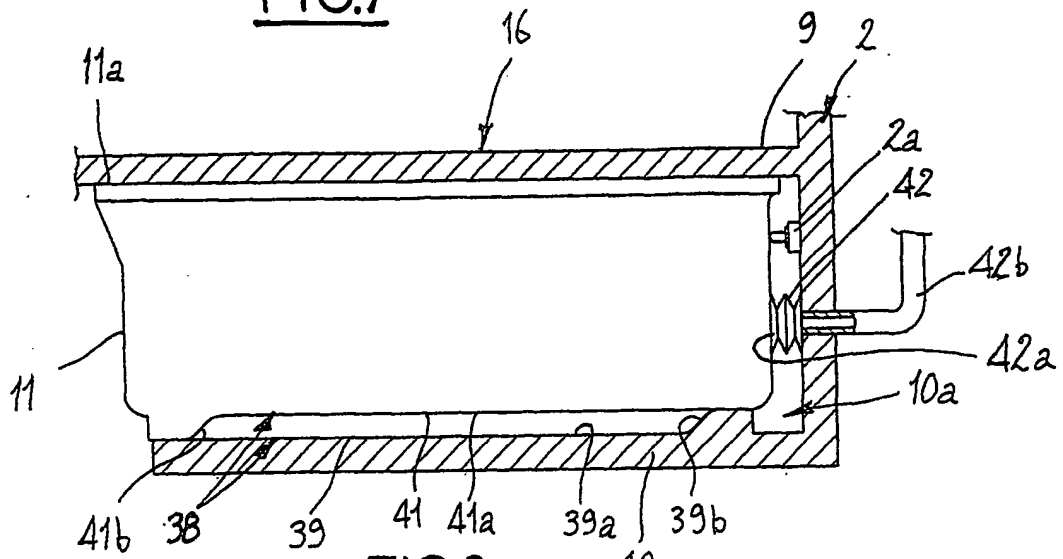

FIG.8

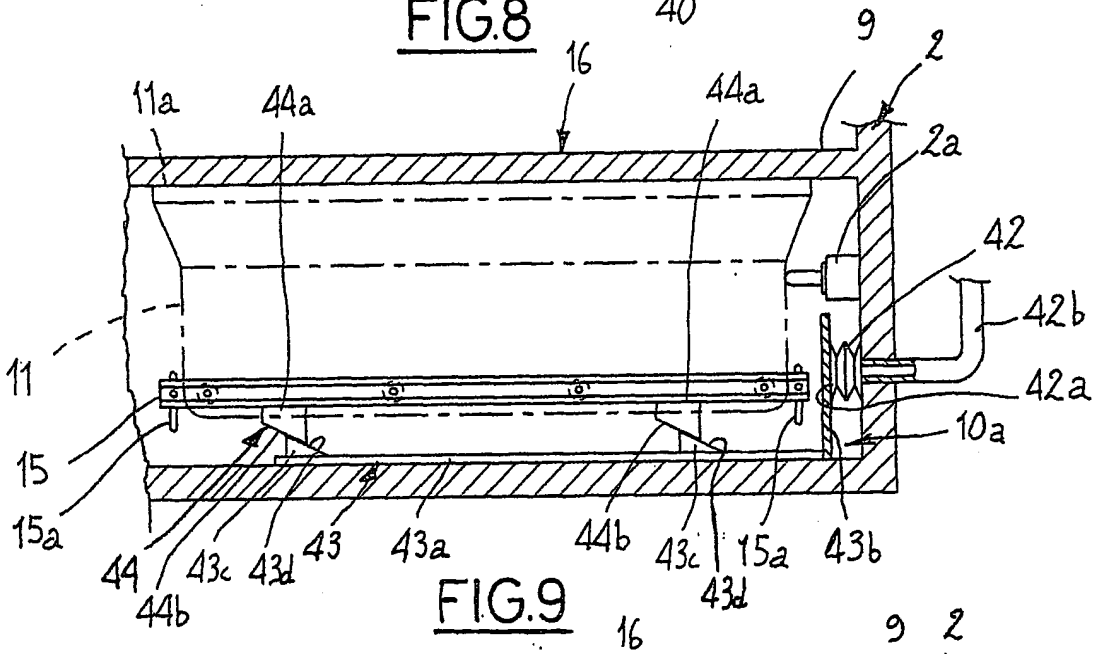

FIG.9

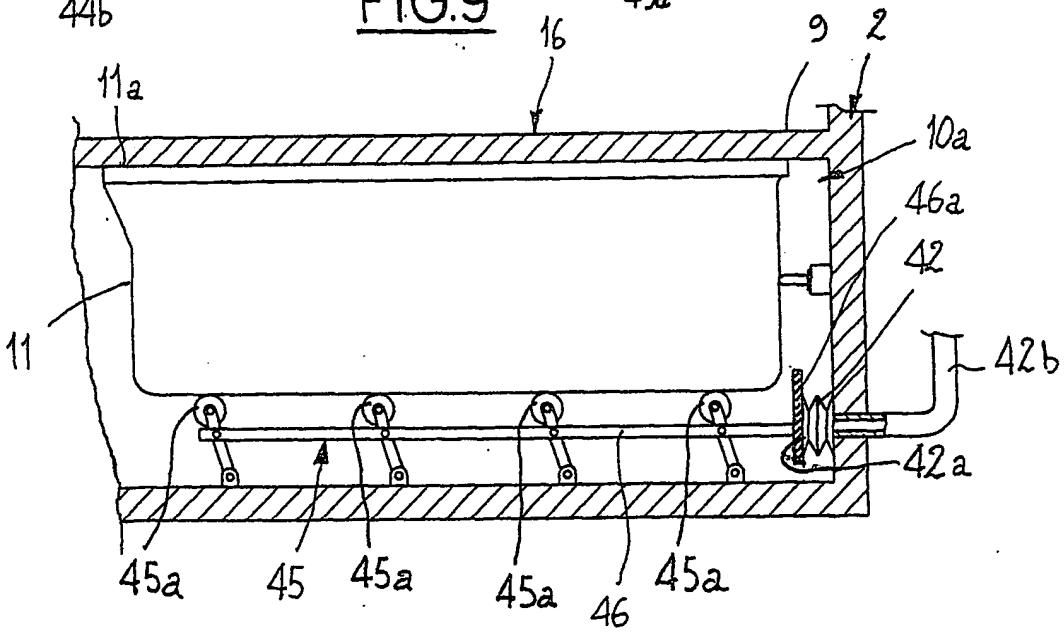

FIG.10

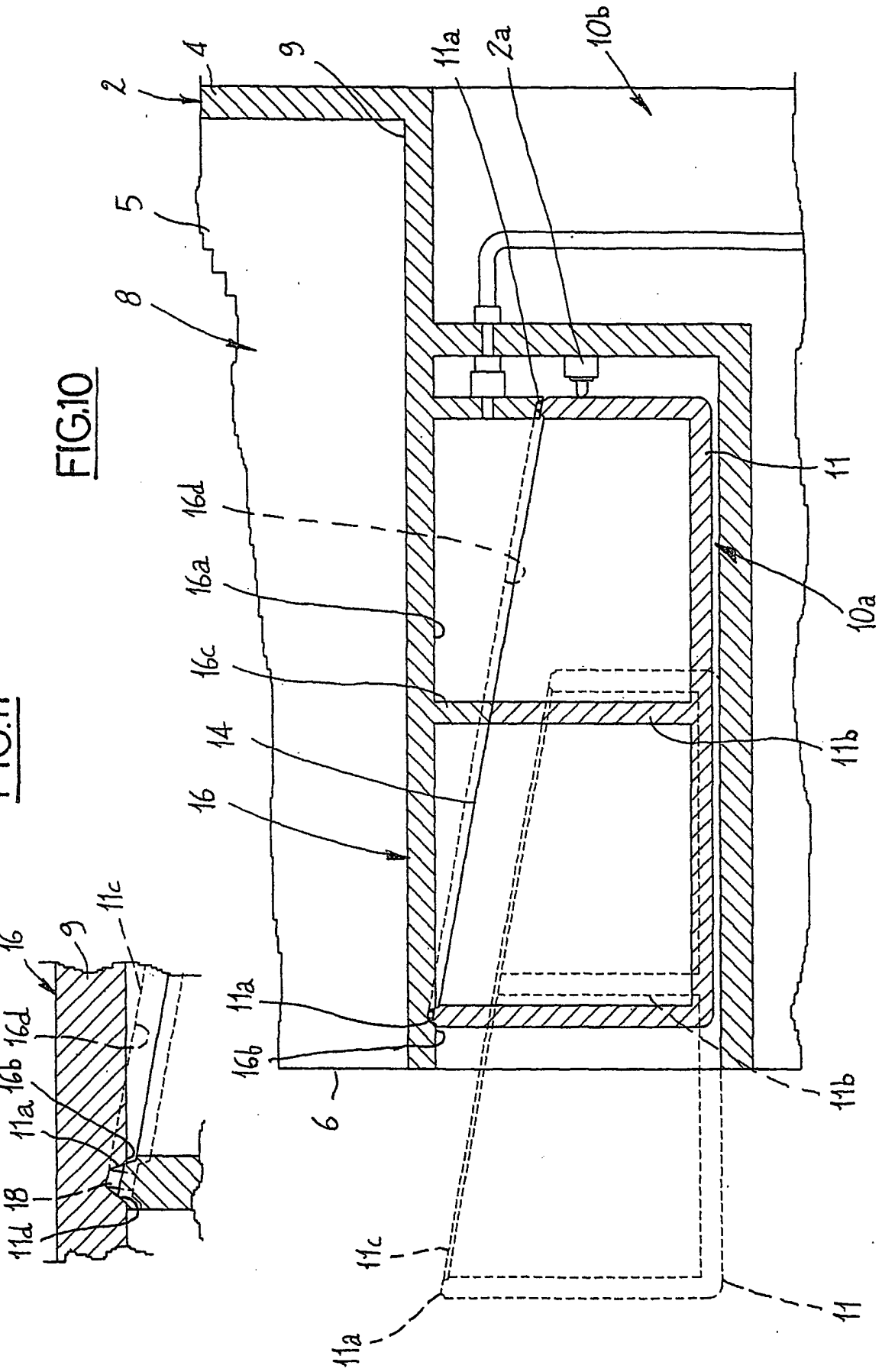
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FIG.11

16
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INTERNATIONAL SEARCH REPORT

Internat[redacted] Application No
PCT/[redacted]00/00090

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 F25D17/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 F25D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 271 240 A (DETRICK ROBERT P ET AL) 21 December 1993 (1993-12-21) column 3, line 33 - line 41; figure 6	1,2,26
A	US 3 751 629 A (EISLER P) 7 August 1973 (1973-08-07) column 16, line 19 - line 42; figures 29-31	1,2,26
A	EP 0 440 296 A (WHIRLPOOL INT ;EURODOMESTICI IND RIUNITE (IT)) 7 August 1991 (1991-08-07) column 3, line 13 -column 4, line 57; figures 2-4	1,2,26

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
23 October 2000	30/10/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Guyon, R

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INTERNATIONAL SEARCH REPORT

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PCT[redacted]00/00090

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 405 680 A (EURODOMESTICI IND RIUNITE ;WHIRLPOOL INT (NL)) 2 January 1991 (1991-01-02) the whole document	1,2,26
E	US 6 090 422 A (TARAGAN ARIE ET AL) 18 July 2000 (2000-07-18) the whole document	1,2,26

INTERNATIONAL SEARCH REPORT

[redacted]ion on patent family members

International Application No
PCT/[redacted]00/00090

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5271240 A	21-12-1993	NONE	
US 3751629 A	07-08-1973	US 3829654 A	13-08-1974
		US 3296415 A	03-01-1967
		US 3573430 A	06-04-1971
		US 3100711 A	13-08-1963
EP 0440296 A	07-08-1991	IT 1238452 B	18-08-1993
		DE 69101496 D	05-05-1994
		DE 69101496 T	01-09-1994
		US 5157940 A	27-10-1992
EP 0405680 A	02-01-1991	IT 1230958 B	08-11-1991
		AU 5797990 A	03-01-1991
		US 5095717 A	17-03-1992
US 6090422 A	18-07-2000	NONE	